PB-227 857

# XYPLOT

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Federal Water Pollution Control Administration
Annapolis, Maryland

July 1969

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PB 227 857

Chesapeake Technical Support Laboratory
Middle Atlantic Region
Federal Water Pollution Control Administration
U.S. Department of the Interior

Technical Report No. 23

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# XYPLOT

by

Paul R. Dorn

July 1969

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XYPLOT was written to aid the Chesapeake Technical Support Laboratory of the Middle Atlantic Region, Federal Water Pollution Control Administration in analyzing and displaying data.

This program uses a modified version of the subroutine PPLOT written by the computing center of the Johns Hopkins University. This modified subroutine was incorporated in the plotting package, LNEPLT. For further information on this package, see Technical Report No. 21.

XYPLOT is operational on the IBM 360/Model 65 at the United States Geological Survey, Department of the Interior in Washington, D.C. The program was compiled using the IBM G-level compiler. The program should work with little or no change on any 360 IBM computer having a G or H level compiler.

For further information regarding this and other current plotting routines, contact Dr. Norbert Jaworski, CTSL, Annapolis Science Center, Annapolis, Maryland, 21401, or phone 1-301-268-5038.

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**PROGRAM**: XYPLOT

**PURPOSE**: XYPLOT is a STATPAC format program which produces a line plot of one or two dependent variables versus a common independent variable.

DESCRIPTION:

XYPLOT will plot on the 1403 printer one or two dependent variables versus a common independent variable for any number of observations. Each plot can contain from 1 to 400 points for each Y (dependent) variable. If more observations are selected, they are plotted on another graph. The scales are varied from graph to graph, even within the same job (e.g. if 600 points are to be plotted, the scale for the first plot--which might contain 400 points, is different from the scale for the second graph--which contains the other 200 points.) This feature may be overridden by selecting your own scaling factors. (See the RANGE SELECTOR CARD.)

Options are available to vary the number of lines in the Y-direction (50 lines is the default option), to specify the number of points per plot (default selection is 200), to use a common Y as well as a common X scale, to select your own scales for the axes, to rename the selected variables, and to select specific observations.

The program will handle indeterminant values as well as complete observations. The program checks the indeterminant codes of the three (or two) selected variables. If all of them are blank, the observation is used. If the X-variable is indeterminant, the observation is skipped.

Normally, the observation is also skipped if either of the Y-variables has an indeterminant code. However, an option is available so if only one of the Y-variables does not contain an indeterminant, that point will be plotted and the other Y-value ignored. (Naturally

this option is not used when plotting a single Y-variable.) Therefore, the number of points of the first Y-variable plotted does not have to equal the number of points of the second Y-variable plotted. The plot is generated as soon as one of the Y-variables has the maximum number of points per plot, regardless of the status of the other Y-variable. (See the NUMBER OF POINTS/PLOT CARD.)

RESTRICTIONS:

A maximum of 99999 rows (observations) and 199 columns (variables) is permitted on the input tape, with a maximum of 199 pairs of selected rows with a total of 99999 individual rows, and two or three selected columns.

PROGRAM RUN PREPERATION:

The following is a complete deck setup for this program:

1. JOB card
2. System control cards (including object or source deck)
3. Header card
4. Variable selector card
5. Observation selector card*
6. Variable ID card*
7. Line count card*
8. Number of points/plot card*
9. Range card*
10. End card (delimiter)

*Optional cards--see the various sections for the usage of each card.

If more than one run is to be performed, repeat cards three through nine as necessary. The final card should be the delimiter card.

JOB CARD:

The JOB card cannot be catalogued and is installation as well as machine dependent. Below is the specification for the 360/65 located in the Department of the Interior building, in Washington D.C. The structure of the JOB card changes occasionally, and one should check with the computer center before using the below form.

Card 1 -

| Card Columns | Contents |
|---|---|
| 1 - 2 | // |
| 3 | Center Code:<br>D = Denver, Colorado<br>F = Flagstaff, Arizona<br>I = Crystal Plaza, Virginia<br>M = Menlo Park, California<br>R = Rolla, Missouri<br>W = Washington, D.C. |
| 4 - 5 | Agency Code. |
| 6 - 8 | User registration code. |
| 9 - 10 | User's ID. May be changed by user as desired. Do not use the same two characters for different jobs run during the same day. |
| 11 | Blank. |
| 12 - 14 | JOB (i.e. the word JOB). |
| 15 | Blank. |
| 16 | ( (Left parenthesis). |
| 17 - 20 | Program Number. |

| Card Columns | Contents |
|---|---|
| 21 | , (Comma). |
| 22 - 25 | Auxiliary account number. |
| 26 | , (Comma). |
| 27 - 30 | Estimated execution time in minutes. Requires four numeric digits. |
| 31 | , (Comma). |
| 32 - 35 | Estimated lines of print expressed in thousands of lines. Requires four digits. |
| 36 | , (Comma). |
| 37 - 40 | Estimated number of cards to be punched. Requires four numeric digits. |
| 41 | , (Comma). |
| 42 | Reserved for future use; must be a 1 punch. |
| 43 | , (Comma). |
| 44 | Reserved for future use; must be a 1 punch. |
| 45 | , (Comma). |
| 46 | Type of run:<br>C = Compile only<br>T = Test of program<br>P = Production use of program |
| 47 | , (Comma). |
| 48 - 49 | Number of lines per page. A value of zero suppresses page overflow tests. If this field (and the preceding comma) is eliminated, a default option of 61 lines per page is used. In this case the following fields are shifted left 3 columns. (Except 62-72) |
| 50 | ) (Right parenthesis). |
| 51 | , (Comma). |

| Card Columns | Contents |
|---|---|
| 52 | ' (Apostrophe). |
| 53 - 61 | Name of the user. |
| 62 | ' (Apostrophe). |
| 63 | , (Comma). |
| 64 - 71 | Blank. |
| 72 | X (The letter X). |

Card 2 -

| Card Columns | Contents |
|---|---|
| 1 - 2 | // |
| 3 - 15 | Blank. |
| 16 - 25 | MSGLEVEL=1 |
| 26 | , (Comma). |
| 27 - 33 | CLASS=C |
| 34 - 72 | Blank. |

SYSTEM CONTROL CARDS:

If an object deck is used:

Card 1 -

```
1
//bEXECbLINKFORT,REGION.GO=100K,TIME.GO=J
```

where J is the time required to run the program (in minutes). The b stands for a blank space.

Card 2 -

```
1
//LKED.SYSINbDDb*
```

Next comes the object deck (including its delimiter).

If a source deck is used:

Card 1 -

```
1
//bEXECbFORTGCLG,PARM.FORT='DECK',REGION.GO=100K,TIME.GO=J
```

where J is as before.

Card 2 -

```
1
//FORT.SYSINbDDb*
```

Next comes the source deck (including its delimiter).

Cards 3 & 4 -

If the data resides on the disc SYSDK:

```
1
//GO.FT10F001bDDbDSN=&NAME,UNIT=SYSDK,DISP=(OLD,PASS/DELETE,DELETE),
//bDCB=(RECFM=VB,LRECL=RRR,BLKSIZE=BBBB)
```

where &NAME is the name of the storage space. (The & signifies the storage is temporary--it exists only for the extent of the job.)

PASS is used if the data file is used later on; otherwise use DELETE.

If the data resides on magnetic tape, use the following cards:

```
1
//GO.FT10F001bDDbUNIT=2400,LABEL=(,SL),VOLUME=(,RETAIN,,,SER=YYYYY),
//bDCB=(RECFM=VB,LRECL=RRR,BLKSIZE=BBBB),
//bDISP=(OLD,KEEP),DSN=STAPAC
```

The letters "YYYYYY" in the first tape card represent a six digit input tape number (leading zeros must be given).

The quantities "RRR" and "BBBB" are computed as follows:

RRR = 8M + 24 where M = number of columns in the data matrix.

BBBB = K(RRR) + 4 where K is an integer chosen so that the positive difference (7200-BBBB) is as small as posible.

If a tape is used, a tape setup card is required. Its form is:

| Columns | Contents |
|---|---|
| 1 - 9 | /*MESSAGE |
| 10 - 12 | Blank. |
| 13 - 20 | The same characters as in columns 3-10 of the JOB card. |
| 21 - 22 | Blank. |
| 23 - 27 | SETUP |
| 28 - 29 | Blank. |
| 30 - 36 | The number of the tape used (i.e. YYYYYY). |
| 37 - 38 | /9 |

If the tape is written on as well as read during this job, in column 39 place an R (for ring in). This card should be placed right after the JOB card. (This card's format is particular to the 360/65 in Washington D.C.)

Card 5 -

```
1
//GO.SYSINbDDb*
```

HEADER CARD -

| Columns | Format | Entry | Description |
|---|---|---|---|
| 1-30 | 7A4,A2 | TITLE | Up to 30 characters of alphanumeric information used to title the output for this data set. It is also used as the title of the graph. |
| 31-38 | 2A4 | INPUT ID | Up to 8 characters of alphanumeric information used to identify the input data set. |
| 39-43 | I5 | INPUT N | The number of rows in the input data matrix (right justified). |
| 44-46 | I3 | INPUT M | The number of columns in the input data matrix (right justified, 199). |
| 47-56 | 10I1 | OPTIONS | See the following sheet. |
| 73-77 | I5 | PRON | The number of pairs or row numbers needed to select the desired rows of the input matrix. (If blank, all rows are included. If not blank, this number must be right justified and row selector cards must be included.) |

OPTIONS -

OPTION( 1) - 0 - 50 lines are used for the Y-axis.
1 - LINE COUNT card gives the number of lines in the Y-direction.

OPTION( 2) - 0 - 200 points for each Y-variable are plotted per graph.
1 - POINTS/PLOT card gives the number of points for each variable to be plotted per graph.

OPTION( 3) - 0 - Both Y-variables must not contain indeterminants for the points to be plotted.
1 - If one of the Y-variables does not contain an indeterminant, that point will be plotted.

OPTION( 4) - 0 - Two Y-variables will be plotted.
1 - One Y-variable will be plotted.

OPTION( 5) - 0 - Seperate Y-scales are calculated.
1 - A common Y-scale is used.

OPTION( 6) - 0 - The program calculates the minimum and maximum values of the plot's scale.
1 - The user supplies maximum and minimum values to be used in scaling.

OPTION( 7) - NOT USED.

OPTION( 8) - NOT USED.

OPTION( 9) - NOT USED.

OPTION(10) - 0 - No action taken.
1 - New variable names are read in for the three (or two) selected variables.

VARIABLE SELECTOR CARD -

In columns 1-3 place the number of the independent variable. The first Y variable should be placed in columns 4-6. The second dependent variable should be placed in columns 7-9. (If only one Y variable is to be plotted, leave columns 7-9 blank.) The numbers should be right justified.

OBSERVATION SELECTOR CARD -

These cards are used only if PRON on the HEADER card is non-zero. The number of pairs of row numbers used to select the desired rows of the data matrix is entered in the field PRON, right justified. Each pair specifies that the rows FROM and including the first member of the pair TO and including the last member of the pair to be selected. The pairs must be entered starting in the left most field of the card (columns 1-5) and continuing across eight pairs per card. If more pairs are used, continue on another card. If a particular pair consists of only one observation, the FROM portion should be completed and the TO portion left blank. The 'FROM' members are entered in columns 1-5, 11-15, 21-25, etc., while the 'TO' portions are entered in columns 6-10, 16-20, 26-30, etc.

The row numbers must form an increasing sequence (except the blank 'TO' field signifying a single observation); i.e. rows must be selected in the order they appear in the data matrix. These numbers must also be right justified.

VARIABLE ID CARD -

This card is used if OPTION(10) is not blank. In columns 1-8 place the new name of the independent variable. In columns 9-16 place the new name of the first dependent variable and in columns 17-24 place the name of the second dependent variable. Note that these names do not replace the original names on the STATPAC tape.

LINE COUNT CARD -

This card is used if OPTION(1) is not blank or zero. In columns 1-3, place the number of lines to be used for the Y-axis. This number should be right justified. Note that this is actually one less than the number of lines actually plotted since a zero line is used. This number should be a multiple of ten (10). Leaving this option blank gives a plot which just fills one page of output (50 lines). When using this option, be sure to specify page overflow test suppression on the JOB card if more than fifty lines/plot is desired.

RANGE CARD -

This card is used if OPTION(6) is non-zero. It gives the coordinates of the maximum and minimum values of the plot for the X and Y axes. If this option is not used, the maximum and minimum values of the variables being plotted gives the graph's range. The format of the card is:

| Columns | Value |
|---|---|
| 1 - 10 | XMIN |
| 11 - 20 | XMAX |
| 21 - 30 | YMIN1 |
| 31 - 40 | YMAX1 |
| 41 - 50 | YMIN2 |
| 51 - 60 | YMAX2 |

The data may be entered in decimal or scientific notation. If only one Y-variable is plotted, columns 41-60 may be left blank. If a common Y-scale is desired, the Y-minima and Y-maxima should be the same. These values must be at least as large as the actual coordinates of the plotted values or else the normal method is used to select the ranges.

<u>END</u> <u>CARD</u> (delimiter) -

This must physically be the last card of the deck. It has the form:

```
1
/*
```

(Note that another delimiter occurs right after the object or source deck.)

IBM GENERAL PURPOSE CARD PUNCHING FORM

| JOB | |
|---|---|
| BY | DATE |

NOTES:

PUNCHING INSTRUCTIONS

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WRITTEN AS: | | | | | | | | | | | | |
| PUNCH AS: | | | | | | | | | | | | |

FIELD IDENTIFICATION

| 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
|---|---|---|---|---|---|---|---|
| 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 |

| | | |
|---|---|---|
| 1 | //W18000AA JØB (0000,0000,1111,1111,1111,1,1,T,61),'NAME ', | X 1 |
| 2 | // MSGLEVEL=1, CLASS=C | 2 |
| 3 | /*MESSAGE W18000AA SETUP 004444/9R | TAPE 3 |
| 4 | // EXEC LINKFØRT,REGIØN.GØ=100K,TIME.GØ=2 | ØBJECT 4 |
| 5 | //LKED.SYSIN DD * | ØBJECT 5 |
| 6 | OBJECT DECK | |
| 7 | /* | ØBJECT 6 |
| 8 | // EXEC FØRTGCLG,REGIØN.GØ=100K,TIME.GØ=2 | SØURCE 4 |
| 9 | //FØRT.SYSIN DD * | SØURCE 5 |
| 10 | SOURCE DECK | |
| 11 | /* | SØURCE 6 |
| 12 | //GØ.FT10F001 DD UNIT=2400,LABEL=(,SL),VØLUME=(,RETAIN,,,SER=004444), | TAPE 7 |
| 13 | // DCB=(RECFM=VB,LRECL=104,BLKSIZE=7180), | TAPE 8 |
| 14 | // DISP=(ØLD,KEEP),DSN=STAPAC | TAPE 9 |
| 15 | //GØ.FT10F001 DD DSN=GNAME,UNIT=SYSDK,DISP=(ØLD,PASS,DELETE), | DISC 7 |
| 16 | // DCB=(RECFM=VB,LRECL=104,BLKSIZE=7180) | DISC 8 |
| 17 | //GØ.SYSIN DD * | 10 |
| 18 | PROGRAM CARDS | |
| 19 | /* | 11 |
| 20 | | |

IBM GENERAL PURPOSE CARD PUNCHING FORM

| JOB | |
|---|---|
| BY | DATE |

NOTES:

PUNCHING INSTRUCTIONS

| WRITTEN AS: | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PUNCH AS: | | | | | | | | | | | | |

FIELD IDENTIFICATION

| 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
|---|---|---|---|---|---|---|---|
| 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 |

1 HEADER CARD

| ALPHANUMERIC TITLE | INPUT | | | OPTIONS | | PRON |
|---|---|---|---|---|---|---|
| | ID | N | M | | | |
| | | | | | | |

5

6

7 VARIABLE SELECTOR CARD

| X | Y1 | Y2 |
|---|---|---|
| | | |

10

11

12 OBSERVATION SELECTOR CARD

| FROM | TO | FROM | TO | FROM | TO | FROM | TO | FROM | TO | FROM | TO | FROM | TO | FROM | TO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |

15

16

17 VARIABLE ID NAME CARD

| XNAME | Y1NAME | Y2NAME |
|---|---|---|
| | | |

20

IBM GENERAL PURPOSE CARD PUNCHING FORM

| JOB | |
|---|---|
| BY | DATE |

NOTES:

PUNCHING INSTRUCTIONS

| WRITTEN AS: | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PUNCH AS: | | | | | | | | | | | | |

FIELD IDENTIFICATION

| 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
|---|---|---|---|---|---|---|---|
| 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 12345678910 |

1 LINE COUNT CARD

2 L

3

4

5

6 POINTS/PLOT CARD

7 M

8

9

10

11 RANGE CARD

| XMIN | XMAX | Y1MIN | Y1MAX | Y2MIN | Y2MAX |
|---|---|---|---|---|---|
| | | | | | |

12

13

14

15

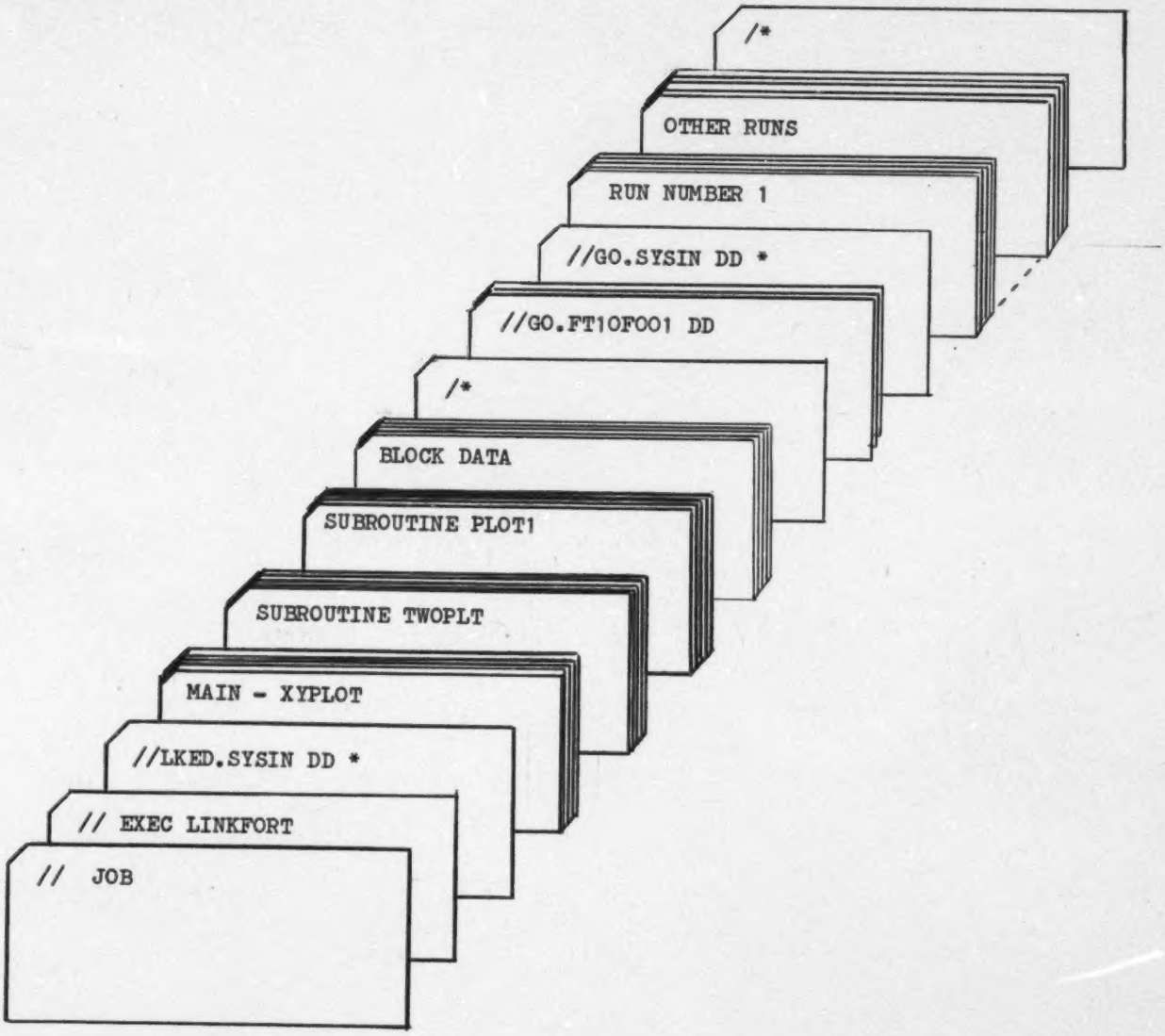
16

17

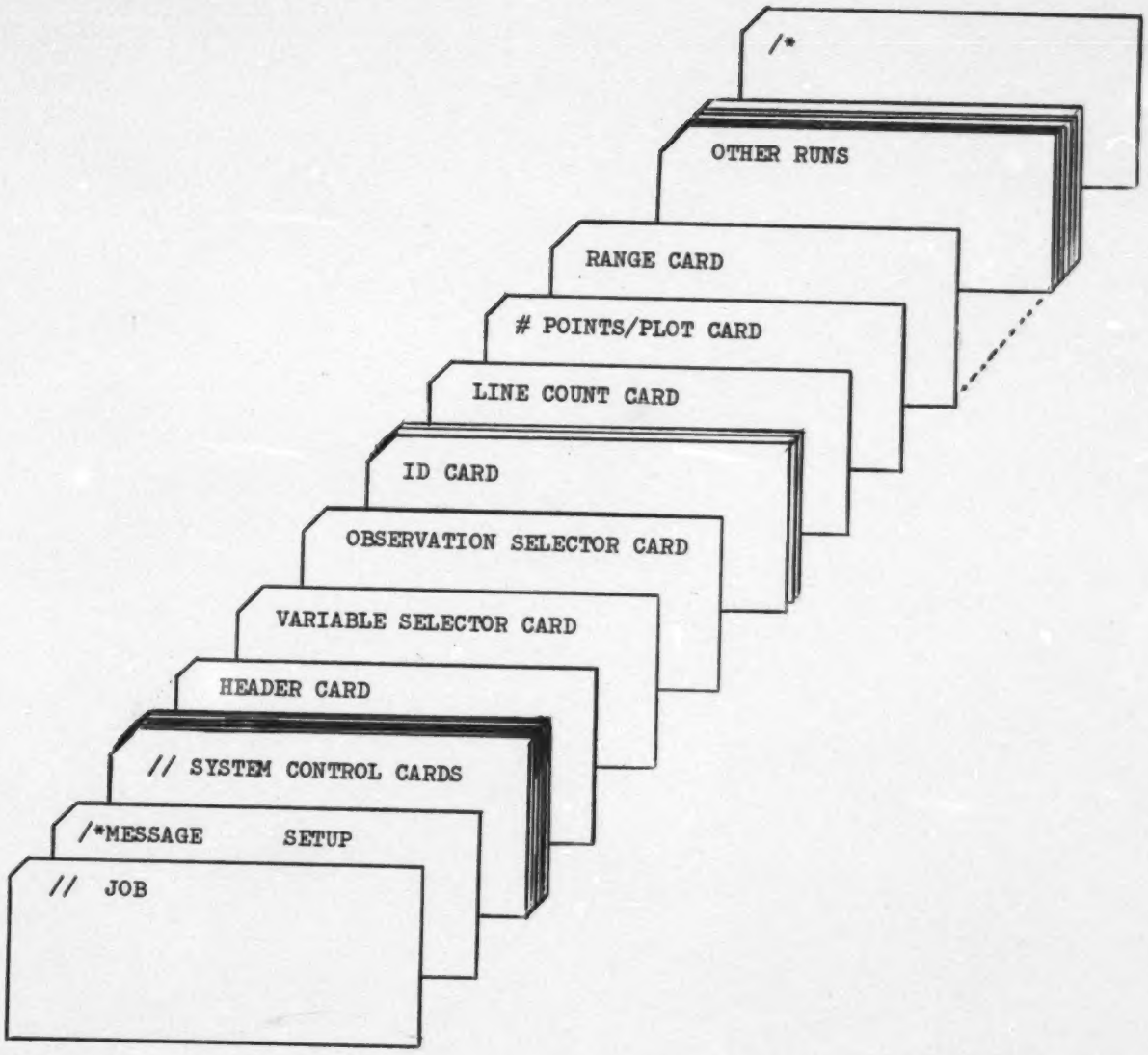
18

19

20

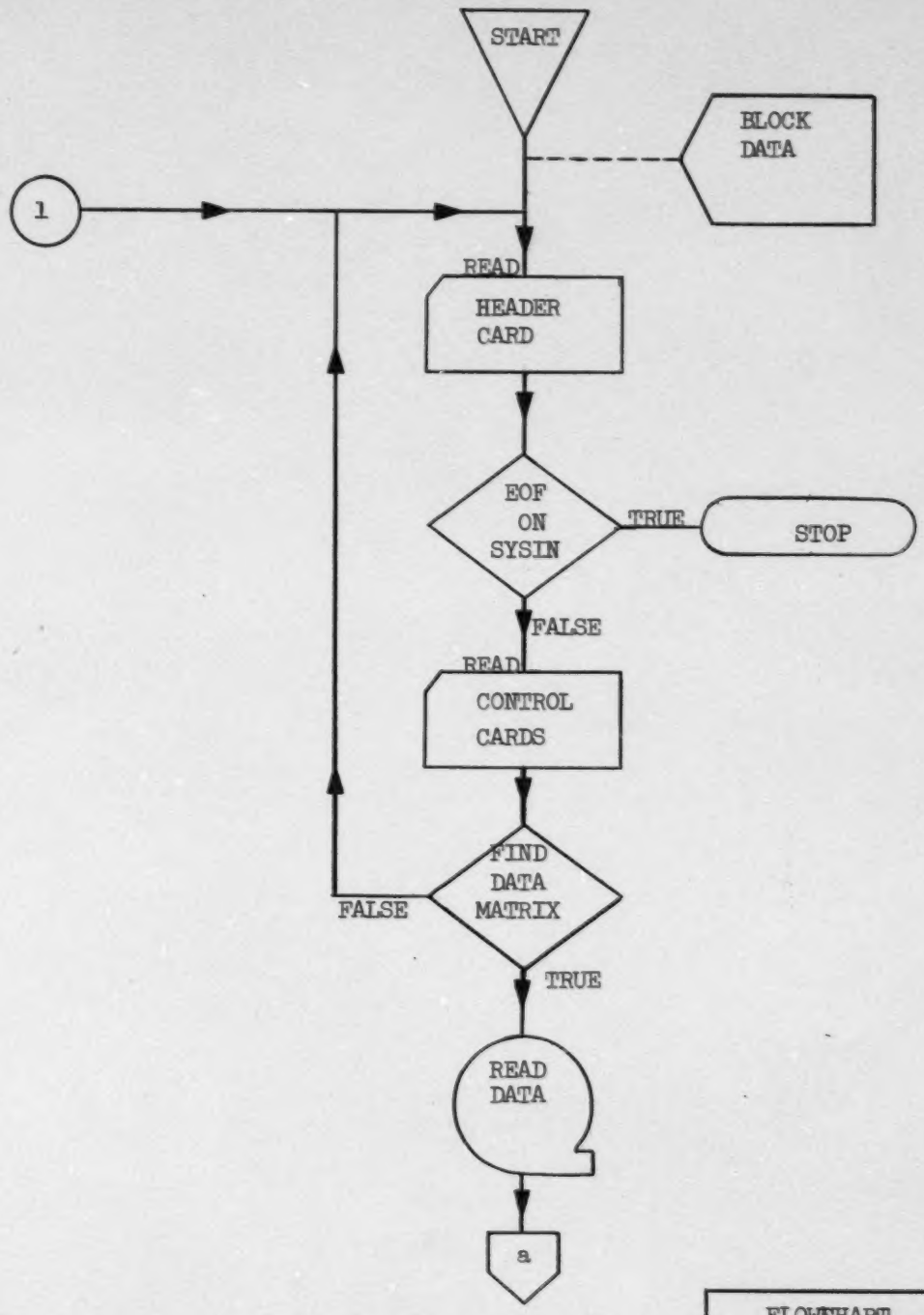

/*
OTHER RUNS
RUN NUMBER 1
//GO.SYSIN DD *
//GO.FT10F001 DD
/*
BLOCK DATA
SUBROUTINE PLOT1
SUBROUTINE TWOPLT
MAIN - XYPLOT
//LKED.SYSIN DD *
// EXEC LINKFORT
// JOB

DECK SETUP

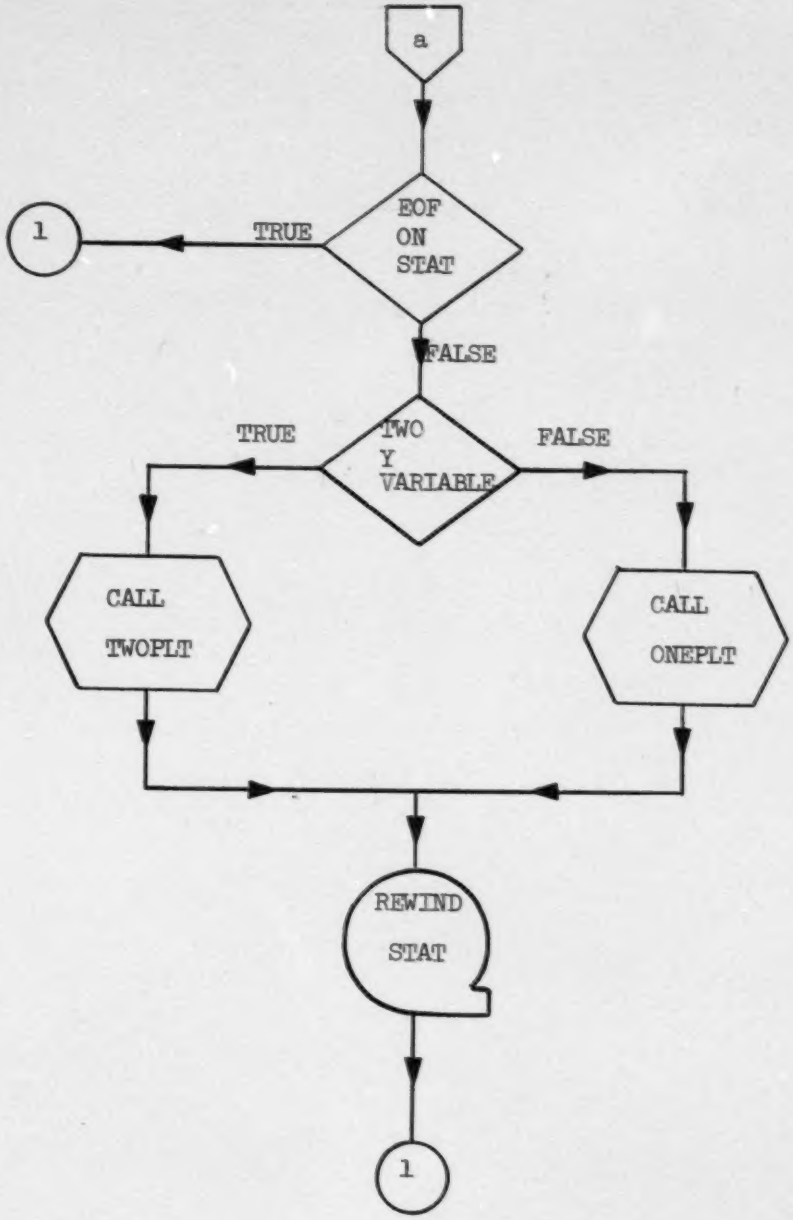



PROGRAM SETUP

**APPENDIX**: Flowchart and Source Listing




| | | | | | |
|---|---|---|---|---|---|
| FLOWCHART | 0 | 1 | OF | 0 | 2 |
| PROGRAM XYPLOT | | | | | |




| | | | | | |
|---|---|---|---|---|---|
| FLOWCHART | 0 | 2 | OF | 0 | 2 |
| PROGRAM XYPLOT | | | | | |

****** X - Y LINE PLOTTER ******

```
C       MAIN PROGRAM FOR X-YPLOT                                        XYP     0
C                                                                       XYP    10
        INTEGER RDIN,RPOUT,STAPAC,TVID(199,2),CID(2),CN,CM,TID(2),TN,TM,TP XYP    20
      $ LK,OPTION(10),TITLE(9),TIT(20)/4H GRA,4HPHIC,4HAL A,4HNALY,4HSIS.,XYP    30
      $ 4H,....14*4H    /,OBSID(2),XNAME(2),Y1NAME(2),Y2NAME(2),SELO(199,2XYP    40
      $ ),TOTAL1,TOTAL2,A(200),BLK/4H    /,LINE,PRON,MCOUNT               XYP    50
        REAL X1PLOT(400),X2PLOT(400),Y1PLOT(400),Y2PLOT(400),X(199)     XYP    60
        INTEGER*2 SYMBOL(3)                                             XYP    70
        EQUIVALENCE(TITLE(1),TIT(7))                                    XYP    80
        COMMON/LINEPLT/Y1NAME,Y2NAME,LINE,XMINMX(4),IOPT1,SYMBOL        XYP    90
        RDIN = 5                                                        XYP   100
        RPOUT = 6                                                       XYP   110
        STAPAC = 10                                                     XYP   120
        A(200) = BLK                                                    XYP   130
   10   READ(RDIN,900,END=170) TITLE,CID,CN,CM,OPTION,PRON              XYP   140
  920   FORMAT(16I5)                                                    XYP   150
  900   FORMAT(7A4,A2,2A4,I5,I3,10I1,16X,I5)                            XYP   160
        REWIND STAPAC                                                   XYP   170
        LINE = 50                                                       XYP   180
        READ(RDIN,910) IX,IY1,IY2                                       XYP   190
  910   FORMAT(3I3)                                                     XYP   200
        IF(OPTION(4).NE.0) IY2=200                                      XYP   210
        IF(PRON.NE.0) GO TO 20                                          XYP   220
        PRON = 1                                                        XYP   230
        SELO(1,1) = 1                                                   XYP   240
        SELO(1,2) = CM                                                  XYP   250
        GO TO 40                                                        XYP   260
   20   READ(RDIN,920)  ((SELO(I,J),J=1,2),I=1,PRON)                    XYP   270
        DO 30 I = 1,PRON                                                XYP   280
   30   IF(SELO(I,2).EQ.0) SELO(I,2)=SELO(I,1)                          XYP   290
   40   IF(OPTION(10).NE.0) READ(RDIN,900) XNAME,Y1NAME,Y2NAME          XYP   300
        IF(OPTION(1).NE.0) READ(RDIN,910) LINE                          XYP   310
        MCOUNT = 200                                                    XYP   320
        IF(OPTION(2).NE.0) READ(RDIN,910) MCOUNT                        XYP   330
        MCOUNT = MAX0(MCOUNT,10)                                        XYP   340
        MCOUNT = MIN0(MCOUNT,400)                                       XYP   350
        IF(OPTION(6).NE.0) READ(RDIN,930) XMINMX                        XYP   360
   50   READ(STAPAC,END=180) TID,TN,TM,((TVID(I,J),J=1,2),I=1,TM)       XYP   370
        IF((TID(1).EQ.CID(1)).AND.(TID(2).EQ.CID(2))) GO TO 70          XYP   380
        DO 60 I = 1,TN                                                  XYP   390
```

```
   50   READ(STAPAC,END = 180)                                          XYP   400
        GO TO 50                                                        XYP   410
   70   WRITE(PROUT,1000)  TITLE,CID,CN,CM,OPTION                       XYP   420
C                                                                       XYP   430
 1000   FORMAT('1X-Y PLOTTING'///7X,'TITLE',22X,'INPUT ID',7X,'N',5X,'M',4  XYP   440
     $ X,'***** OPTIONS *****'/1X,7A4,A2,3X,2A4,3X,I5,3X,I3,3X,10I2//)   XYP   450
        IF(TN.EQ.CN) GO TO 80                                           XYP   460
        WRITE(PROUT,1010) TN,CN,CID                                     XYP   470
        GO TO 10                                                        XYP   480
   80   IF(TM.EQ.CM) GO TO 90                                           XYP   490
        WRITE(PROUT,1020) TM,CM,CID                                     XYP   500
        GO TO 10                                                        XYP   510
 1010   FORMAT(' TAPE N',I6,' NOT EQUAL CARD N',I6,' FOR DATA SET ',2A4)  XYP   520
 1020   FORMAT(' TAPE M',I4,' NOT EQUAL CARD M',I4,' FOR DATA SET ',2A4)  XYP   530
   90   IF(OPTION(10).NE.0) GO TO 110                                   XYP   540
        DO 100 I= 1,2                                                   XYP   550
        XNAME(I) = TVID(IX,I)                                           XYP   560
        Y1NAME(I) = TVID(IY1,I)                                         XYP   570
  100   IF(IY2.NE.200) Y2NAME(I) = TVID(IY2,I)                          XYP   580
  110   IF(IY2.EQ.200) WRITE(PROUT,1030) XNAME,IX,Y1NAME,IY1            XYP   590
        IF(IY2.NE.200) WRITE(PROUT,1030) XNAME,IX,Y1NAME,IY1,Y2NAME,IY2  XYP   600
 1030   FORMAT(' SELECTED VARIABLES -'/10X,3(2A4,1H(,I3,1H),5X))        XYP   610
        WRITE(PROUT,1040) ((SELO(I,J),J=1,2),I=1,PKON)                  XYP   620
 1040   FORMAT('0SELECTED OBSERVATION PAIRS -'/(1X,10(1X,I5,1H-,I5,1X)))  XYP   630
        ICT1 = 0                                                        XYP   640
        ICT2 = 0                                                        XYP   650
        TOTAL1 = 0                                                      XYP   660
        TOTAL2 = 0                                                      XYP   670
        CALL GIVMM(0)                                                   XYP   680
  930   FORMAT(6G10.6)                                                  XYP   690
        IF(OPTION(6).NE.0) CALL MAXMIN(1,1,1,1,1,1,XMINMX(1),XMINMX(2),XMI  XYP   700
     $ MMX(3),XMINMX(4),XMINMX(5),XMINMX(6))                            XYP   710
        IF(OPTION(6).NE.0) CALL GIVMM(1)                                XYP   720
        DO 150 K = 1,PKON                                               XYP   730
        N1 = SELO(K,1)                                                  XYP   740
        N2 = SELO(K,2)                                                  XYP   750
        DO 150 N=N1,N2                                                  XYP   760
  120   READ(STAPAC) TBLK,WT,OBSID,INDET,(X(I),I=1,TM),(A(I),I=1,TM)    XYP   770
        IF(TBLK.NE.N) GO TO 120                                         XYP   780
        IF((A(IX).NE.BLK).OR.((A(IY1).NE.BLK).AND.(A(IY2).NE.BLK)).OR.((OP  XYP   790
     $ TION(3).EQ.0).AND.((A(IY1).NE.BLK).OR.(A(IY2).NE.BLK)))) GO TO 150  XYP   800
        IF(A(IY1).NE.BLK) GO TO 130                                     XYP   810
        ICT1 = ICT1+1                                                   XYP   820
        TOTAL1 = TOTAL1+1                                               XYP   830
        X1PLOT(TOTAL1)=X(IX)                                            XYP   840
        Y1PLOT(TOTAL1) = X(IY1)                                         XYP   850
```

```
  130   IF(OPTION(4).NE.0) GO TO 140                                      XYP  860
        IF(A(IY2).NE.BLK) GO TO 140                                       XYP  870
        ICT2 = ICT2+1                                                     XYP  880
        TOTAL2 = TOTAL2+1                                                 XYP  890
        X2PLOT(TOTAL2) = X(IX)                                            XYP  900
        Y2PLOT(TOTAL2) = X(IY2)                                           XYP  910
  140   IF((TOTAL1.LT.MCOUNT).AND.(TOTAL2.LT.MCOUNT)) GO TO 150           XYP  920
        IF(OPTION(4).EQ.0) CALL TWOPLT(TOTAL1,TOTAL2,X1PLOT,Y1PLOT,X2PLOT,XYP  930
     $ Y2PLOT,OPTION(5),TIT)                                              XYP  940
        IF(OPTION(4).NE.0) CALL ONEPLT(TOTAL1,X1PLOT,Y1PLOT,TIT)          XYP  950
        TOTAL1 = 0                                                        XYP  960
        TOTAL2 = 0                                                        XYP  970
  150   CONTINUE                                                          XYP  980
  160   CONTINUE                                                          XYP  990
        IF((OPTION(4).EQ.0).AND.((TOTAL1.GT.0).OR.(TOTAL2 .GT.0))) CALL TW XYP 1000
     $ OPLT(TOTAL1,TOTAL2,X1PLOT,Y1PLOT,X2PLOT,Y2PLOT,OPTION(5),TIT)      XYP 1010
        IF((OPTION(4).NE.0).AND.(TOTAL1.GT.0)) CALL ONEPLT(TOTAL1,X1PLOT,Y XYP 1020
     $ 1PLOT,TIT)                                                         XYP 1030
        WRITE(PROUT,1000) TITLE,CID,CN,CM,OPTION                          XYP 1040
        WRITE(PROUT,1050) XNAME,Y1NAME,ICT1                               XYP 1050
 1050   FORMAT('ONUMBER OF VALID OBSERVATIONS FOR ',2A4,' VERSUS ',2A4,' - XYP 1060
     $  ',I5)                                                             XYP 1070
        IF(OPTION(4).EQ.0) WRITE(PROUT,1050) XNAME,Y2NAME,ICT2            XYP 1080
        GO TO 10                                                          XYP 1090
  170   REWIND STAPAC                                                     XYP 1100
        STOP                                                              XYP 1110
  180   WRITE(PROUT,1000) TITLE,CID,CN,CM,OPTION                          XYP 1120
        WRITE(PROUT,1060) CID                                             XYP 1130
 1060   FORMAT('0CANNOT FIND DATA MATRIX ',2A4)                           XYP 1140
        GO TO 10                                                          XYP 1150
        END                                                               XYP 1160
C                                                                         XYP 1170
C       PLOTTING SUBROUTINE WHICH PLOTS DATA  OF TWO DEPENDENT VARIABLES  XYP 1180
C       USING THE SAME ABSCISSA.                                          XYP 1190
C                                                                         XYP 1200
        SUBROUTINE TWOPLT(NSP1,NSP2,X1,Y1,X2,Y2,M,HEAD)                   XYP 1210
        REALX1(1),X2(1),Y1(1),Y2(1),XTEMP(11)                             XYP 1220
        INTEGER HEAD(20),NAME1(2),NAME2(2),NAMET(2)                       XYP 1230
        INTEGER*2 A(101),B(101)/101*1H-/,PLUS/1H+/,BLANK/1H /,SYMBOL(3),ON XYP 1240
     $ E/1H1/,EXTRA                                                       XYP 1250
        COMMON/LNEPLT/NAME1,NAME2,LINE,XMIN1,XMAX1,Y1MIN2,Y1MAX2,Y2MIN2,Y2 XYP 1260
     $ MAX2,IOPT1,SYMBOL                                                  XYP 1270
        WRITE(6,1000) HEAD                                                XYP 1280
 1000   FORMAT(1H1,9X,20A4)                                               XYP 1290
        ENTRY PLTTWO(NSP1,NSP2,X1,Y1,X2,Y2,M)                             XYP 1300
        NSP2M1 = NSP2 - 1                                                 XYP 1310
```

```
      KPLT = 2                                                          XYP  1320
      GO TO 200                                                         XYP  1330
      ENTRY ENTPLT(NSP1,X1,Y1,HEAD)                                     XYP  1340
      WRITE(6,1000) HEAD                                                XYP  1350
      ENTRY PLTONE(NSP1,X1,Y1)                                          XYP  1360
      M = 0                                                             XYP  1370
      Y2MAX = -0.E20                                                    XYP  1380
      Y2MIN = +0.E20                                                    XYP  1390
      KPLT = 1                                                          XYP  1400
      NSP2 = 0                                                          XYP  1410
      WRITE(6,1010)                                                     XYP  1420
 1010 FORMAT(1H0)                                                       XYP  1430
  200 NSP1M1 = NSP1 - 1                                                 XYP  1440
      XMAX = X1(NSP1)                                                   XYP  1450
      XMIN = X1(NSP1)                                                   XYP  1460
      DO 1 I=1,NSP1M1                                                   XYP  1470
      IP1 = I+1                                                         XYP  1480
      DO 2 J=IP1,NSP1                                                   XYP  1490
      IF (Y1(J).LE.Y1(I)) GO TO 2                                       XYP  1500
C                                                                       XYP  1510
C     SORT THE Y1 ARRAY INTO DESCENDING ORDER                           XYP  1520
C                                                                       XYP  1530
      T = Y1(I)                                                         XYP  1540
      Y1(I) = Y1(J)                                                     XYP  1550
      Y1(J) = T                                                         XYP  1560
      T = X1(I)                                                         XYP  1570
      X1(I) = X1(J)                                                     XYP  1580
      X1(J) = T                                                         XYP  1590
    2 CONTINUE                                                          XYP  1600
      XMIN = AMIN1(XMIN,X1(I))                                          XYP  1610
    1 XMAX = AMAX1(XMAX,X1(I))                                          XYP  1620
      IF(KPLT .EQ. 1) GO TO 210                                         XYP  1630
      XMIN = AMIN1(XMIN,X2(NSP2))                                       XYP  1640
      XMAX = AMAX1(XMAX,X2(NSP2))                                       XYP  1650
      DO 3 I=1,NSP2M1                                                   XYP  1660
      IP1 = I+1                                                         XYP  1670
      DO 4 J=IP1,NSP2                                                   XYP  1680
      IF (Y2(J).LE.Y2(I)) GO TO 4                                       XYP  1690
      T = Y2(I)                                                         XYP  1700
      Y2(I) = Y2(J)                                                     XYP  1710
      Y2(J) = T                                                         XYP  1720
      T = X2(I)                                                         XYP  1730
      X2(I) = X2(J)                                                     XYP  1740
      X2(J) = T                                                         XYP  1750
    4 CONTINUE                                                          XYP  1760
      XMIN = AMIN1(XMIN,X2(I))                                          XYP  1770
```

```
3       XMAX = AMAX1(XMAX,X2(1))                                        XYP  1780
        XMAX = AMAX1(X1(NSP1), X2(NSP2), XMAX)                          XYP  1790
        XMIN = AMIN1(X1(NSP1), X2(NSP2), XMIN)                          XYP  1800
C                                                                       XYP  1810
C       AT THIS POINT, THE Y ARRAYS ARE ORDERED IN DESCENDING ORDER     XYP  1820
C       AND THE ABSCISSA IS NUMBERED BY (XMIN,XMAX)                     XYP  1830
C                                                                       XYP  1840
        Y2MAX = Y2(1)                                                   XYP  1850
        Y2MIN = Y2(NSP2)                                                XYP  1860
  210   Y1MAX = Y1(1)                                                   XYP  1870
        Y1MIN = Y1(NSP1)                                                XYP  1880
        IF(IOPT1.EQ.0) GO TO 30                                         XYP  1890
        XMIN = AMIN1(XMIN,XMIN1)                                        XYP  1900
        XMAX = AMAX1(XMAX,XMAX1)                                        XYP  1910
        Y1MIN = AMIN1(Y1MIN,Y1MIN2)                                     XYP  1920
        Y1MAX = AMAX1(Y1MAX,Y1MAX2)                                     XYP  1930
        IF(KPLT.EQ.1) GO TO 30                                          XYP  1940
        Y2MIN = AMIN1(Y2MIN,Y2MIN2)                                     XYP  1950
        Y2MAX = AMAX1(Y2MAX,Y2MAX2)                                     XYP  1960
   30   CONTINUE                                                        XYP  1970
        IF (M.NE.1) GO TO 5                                             XYP  1980
        T = AMIN1(Y1MIN,Y2MIN)                                          XYP  1990
        Y1MIN = T                                                       XYP  2000
        Y2MIN = T                                                       XYP  2010
        T = AMAX1(Y1MAX,Y2MAX)                                          XYP  2020
        Y2MAX = T                                                       XYP  2030
        Y1MAX = T                                                       XYP  2040
    5   IF(KPLT.EQ.2) WRITE(6,1020) (SYMBOL(I),I=1,5),NAME1,NAME2,(SYMBOL(  XYP  2050
     1  2),I=1,5)                                                       XYP  2060
 1020   FORMAT(1H0,3X,5A1,3H = ,2A4,T112,2A4,3H = ,5A1)                 XYP  2070
        XSCAL=(XMAX-XMIN)/100                                           XYP  2080
        Y1SCAL=(Y1MAX-Y1MIN)/FLOAT(LINE)                                XYP  2090
        Y2SCAL=(Y2MAX-Y2MIN)/FLOAT(LINE)                                XYP  2100
        WRITE (6,8) (I, I=10,100,10)                                    XYP  2110
    8   FORMAT (1H0, 14X, 1H0, 10(7X, I3))                              XYP  2120
        DO 220 I=1,101,10                                               XYP  2130
  220   P(I)=PLUS                                                       XYP  2140
        DO 9 I=1,101                                                    XYP  2150
    9   A(I) = P(I)                                                     XYP  2160
C       I = Y1 SIGNAL NUMBER                                            XYP  2170
C       J = Y2 SIGNAL NUMBER                                            XYP  2180
C       K = NUMBER OF LINES PRINTED                                     XYP  2190
C                                                                       XYP  2200
        I = 1                                                           XYP  2210
        J = 1                                                           XYP  2220
        K = 0                                                           XYP  2230
```

```
   10 CALL PLOT1(A,ONE,ONE,ONE,1)
      CALL PLOT1(A,ONE,ONE,ONE,101)
11    T = .5*FLOAT(K)
13    IF (I.GT.NSP1) GO TO 14
      ELOWER = Y1MAX - T*Y1SCAL
      EUPPER = ELOWER + Y1SCAL
      IF (Y1(I).GT.EUPPER OR.Y1(I).LT.ELOWER) GO TO 14
      N = (X1(I)-XMIN)/XSCAL + 1.5
      CALL PLOT1(A,SYMBOL(1),SYMBOL(2),SYMBOL(3),N)
      I = I+1
      GO TO 13
14    IF (J.GT.NSP2) GO TO 15
      ELOWER = Y2MAX - T*Y2SCAL
      EUPPER = ELOWER + Y2SCAL
      IF (Y2(J).GT.EUPPER OR.Y2(J).LT.ELOWER) GO TO 15
      N = (X2(J)-XMIN)/XSCAL + 1.5
      CALL PLOT1(A,SYMBOL(2),SYMBOL(1),SYMBOL(3),N)
      J = J+1
      GO TO 14
C
C     READY NOW TO PLOT
C
   15 L = LINE-K
      IF(MOD(L,10).EQ.0) GO TO 17
      WRITE (6,18) A
   18 FORMAT(15X,101A1)
      GO TO 19
   17 YTEMP = Y1MAX - Y1SCAL*FLOAT(K)
      YTEMP2 = Y2MAX-Y2SCAL*FLOAT(K)
      WRITE(6,29) YTEMP,A,YTEMP2
   29 FORMAT(1PF13.3,2X,101A1,1PF11.3)
      IF(L.EQ.0) GO TO 26
   19 IF (L.EQ.1) GO TO 21
      DO 22 II=1,101
   22 A(II) = BLANK
      K = K+1
      GO TO 10
   21 DO 24 II=1,101
   24 A(II)=L(II)
23    K = K+1
      GO TO 10
   26 XTEMP(1) = XMIN
      DO 102 I=2,11
  102 XTEMP(I)=XTEMP(I-1)+XSCAL*10.
      WRITE(6,101) (XTEMP(I),I=1,11,2),(XTEMP(I),I=2,10,2)
  101 FORMAT(10X,6(1PF10.3,10X)/20X,5(1PF10.3,10X))
```

```
      RETURN                                                            XYP  2700
      ENTRY LNECHG(IJ)                                                  XYP  2710
      LINE=IJ                                                           XYP  2720
      GO TO 70                                                          XYP  2730
      ENTRY SYMCHG(EXTRA,IJ)                                            XYP  2740
      SYMBOL(IJ) = EXTRA                                                XYP  2750
      GO TO 70                                                          XYP  2760
      ENTRY NAMCHG(NAMET,IJ)                                            XYP  2770
      DO 50 I=1,2                                                       XYP  2780
      GO TO (40,50),IJ                                                  XYP  2790
40    NAME1(I) = NAMET(I)                                               XYP  2800
      GO TO 60                                                          XYP  2810
50    NAME2(I)=NAMET(I)                                                 XYP  2820
60    CONTINUE                                                          XYP  2830
      GO TO 70                                                          XYP  2840
      ENTRY MAXMIN(I1,I2,I3,I4,I5,I6,X11,X22,Y11,Y12,Y21,Y22)           XYP  2850
      IF(I1.NE.0) XMIN1  = X11                                          XYP  2860
      IF(I2.NE.0) XMAX1  = X22                                          XYP  2870
      IF(I3.NE.0) Y1MIN2 = Y11                                          XYP  2880
      IF(I4.NE.0) Y1MAX2 = Y12                                          XYP  2890
      IF(I5.NE.0) Y2MIN2 = Y21                                          XYP  2900
      IF(I6.NE.0) Y2MAX2 =Y22                                           XYP  2910
      GO TO 70                                                          XYP  2920
      ENTRY GIVMM(I)                                                    XYP  2930
      IOPT1=I                                                           XYP  2940
70    RETURN                                                            XYP  2950
      END                                                               XYP  2960
      SUBROUTINE PLOT1(A,SYM1,SYM2,SYM3,PLACE)                          XYP  2970
      INTEGER*2 SYM1,SYM2,SYM3,A                                        XYP  2980
      INTEGER PLACE                                                     XYP  2990
      DIMENSION A(1)                                                    XYP  3000
      IF(PLACE.LE.0)    GO TO 10                                        XYP  3010
      IF(A(PLACE).EQ.SYM3) RETURN                                       XYP  3020
      IF(A(PLACE).EQ.SYM2) GO TO 30                                     XYP  3030
      A(PLACE) = SYM1                                                   XYP  3040
      RETURN                                                            XYP  3050
10    WRITE(6,20) PLACE                                                 XYP  3060
20    FORMAT(1H1,'TRIED TO PLACE A SYMBOL IN SPACE NUMBER ',I3)         XYP  3070
      STOP                                                              XYP  3080
30    A(PLACE) = SYM3                                                   XYP  3090
      RETURN                                                            XYP  3100
      END                                                               XYP  3110
      BLOCK DATA                                                        XYP  3120
      COMMON/LNEPLT/NAME1,NAME2,LINE,XMINMX(6),IOPT1,SYMBOL             XYP  3130
      INTEGER*2 SYMBOL(3)/1H.,1H*,1HO/                                  XYP  3140
      REAL XMINMX/6*0.0/                                                XYP  3150
```

32

```
      [illegible] NAME1(2)/4HVAR .4H1   /.NAME2(2)/4HVAR .4H2   /.LINE/60/.'   XYP  3160
    $ [illegible]/                                                              XYP  3170
      END                                                                       XYP  3180
```

***** END OF PROGRAM *****

APPENDIX: Use of XYPLOT with the Card Entry Program

XYPLOT already assumes the data is located on a magnetic device in STATPAC format. STATPAC programs allow the user to perform tranformations on the data, select observations, change data in error and other desired changes in the data. Therefore the serious user of this program should consult the STATPAC manual for the other programs in this series. It may be obtained from the U.S. Geological Survey, Computer Center Division, Department of the Interior.

The program which transfers the data from cards to tape is D0092. It is available as an object deck, a source deck, or on the system library.

The deck setup for using this program in conjunction with the XYPLOT program is shown on the next page. (This assumes the library is used to obtain a copy of D0092.)

**IBM** GENERAL PURPOSE CARD PUNCHING FORM

| JOB | |
|---|---|
| BY | DATE |

PUNCHING INSTRUCTIONS

| WRITTEN AS: | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PUNCH AS: | | | | | | | | | | | | |

NOTES:

FIELD IDENTIFICATION

| 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
|---|---|---|---|---|---|---|---|
| 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 |

```
//W00000AA JØB (1111,1111,0002,0020,0000,1,1,T,61),'NAME      ',        X
//                MSGLEVEL=1,CLASS=C
//JØBLIB DD DSN=SYS1.LØADLIB,DISP=(SHR,KEEP)
// EXEC PGM=D0092
//FT06F001 DD SYSØUT=A
//FT11F001 DD DSN=&TEMP,UNIT=SYSDK,DISP=(,PASS,DELETE),
// DCB=(RECFM=VB,LRECL=104,BLKSIZE=7180),
// SPACE=(TRK,(100,10),RLSE)
//FT05F001 DD *
        CONTROL CARDS FOR D0092
        DATA FOR D0092
/*

// EXEC LINKFØRT,REGIØN.GØ=100K,TIME.GØ=2
//LKED.SYSIN DD *
        OBJECT DECK
/*
//GØ.FT10F001 DD DSN=&TEMP,UNIT=SYSDK,DISP=(ØLD,DELETE,DELETE),
// DCB=(RECFM=VB,LRECL=104,BLKSIZE=7180)
//GØ.SYSIN DD *
```

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IBM GENERAL PURPOSE CARD PUNCHING FORM

| JOB | |
|---|---|
| BY | DATE |

NOTES:

PUNCHING INSTRUCTIONS

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WRITTEN AS: | | | | | | | | | | | | |
| PUNCH AS: | | | | | | | | | | | | |

FIELD IDENTIFICATION

| 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
|---|---|---|---|---|---|---|---|
| 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 |

1 CONTROL CARDS FØR XYPLØT
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PAGE 2 OF 2

APPENDIX: SAMPLE PROBLEM

Suppose one is given 50 observations with 6 variables, and one wants the X-variable to be input variable number 3, the first dependent variable to be input variable 2, and the second Y-variable to be input variable 5. Only observations 6 and 31-50 are to be used for the plot. The plot is to have 50 lines in the Y-direction, with the scales selected by the program. There are to be 50 points per plot; the variable names are also to be changed. The data is named DATAbINb.

The data is located on the tape 003516. The input deck and the results follow.

X-Y PLOTTING

| TITLE | INPUT ID | N | M | ***** OPTIONS ***** |
|---|---|---|---|---|
| TEST OF PLOTTING PROGRAM | DRAINAGE | 448 | 10 | 0 1 1 0 0 0 0 0 0 0 |

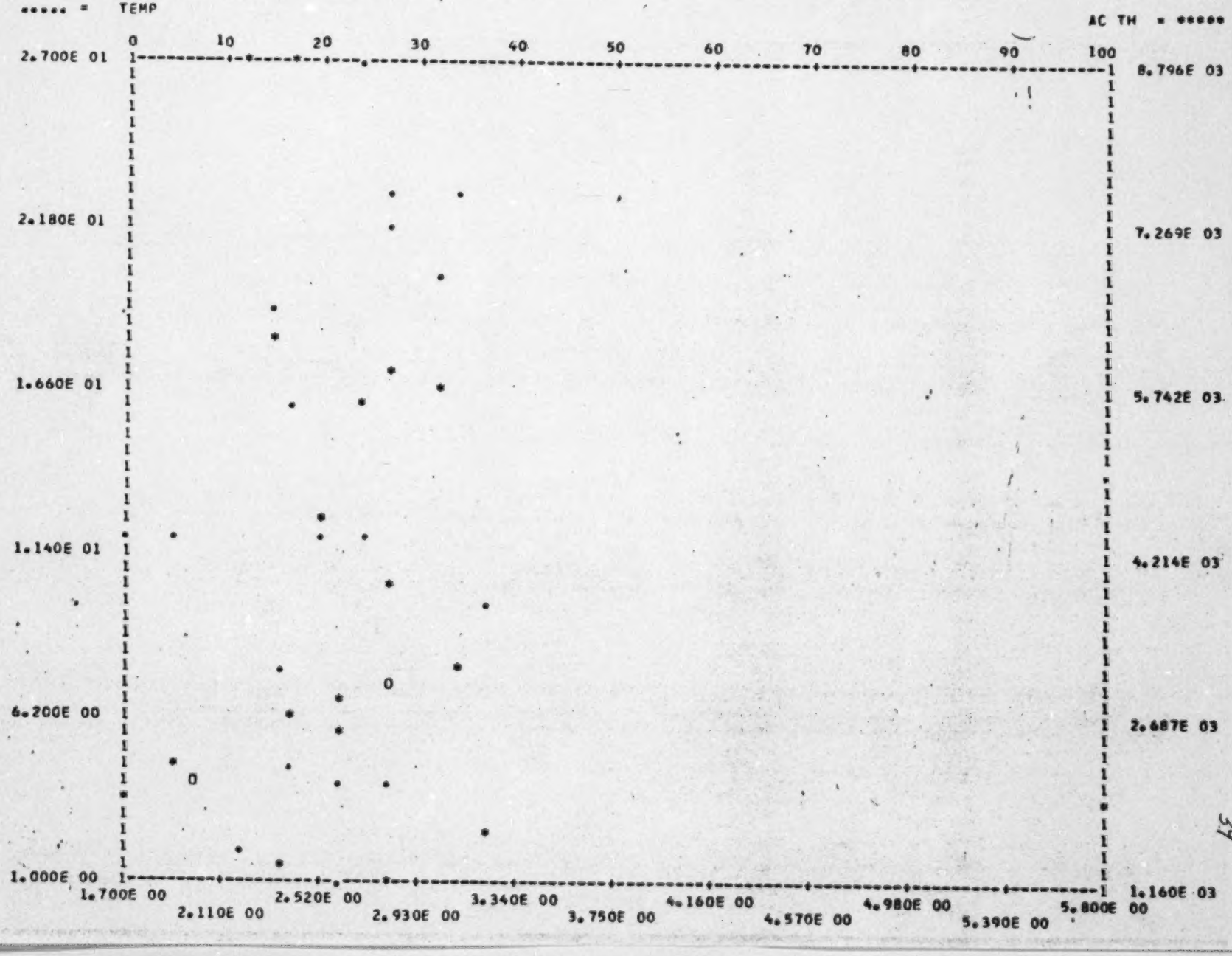
SELECTED VARIABLES -

PH ( 1) TEMP ( 2) AC TH ( 3)

SELECTED OBSERVATION PAIRS -

1- 38

GRAPHICAL ANALYSIS.....TEST OF PLOTTING PROGRAM

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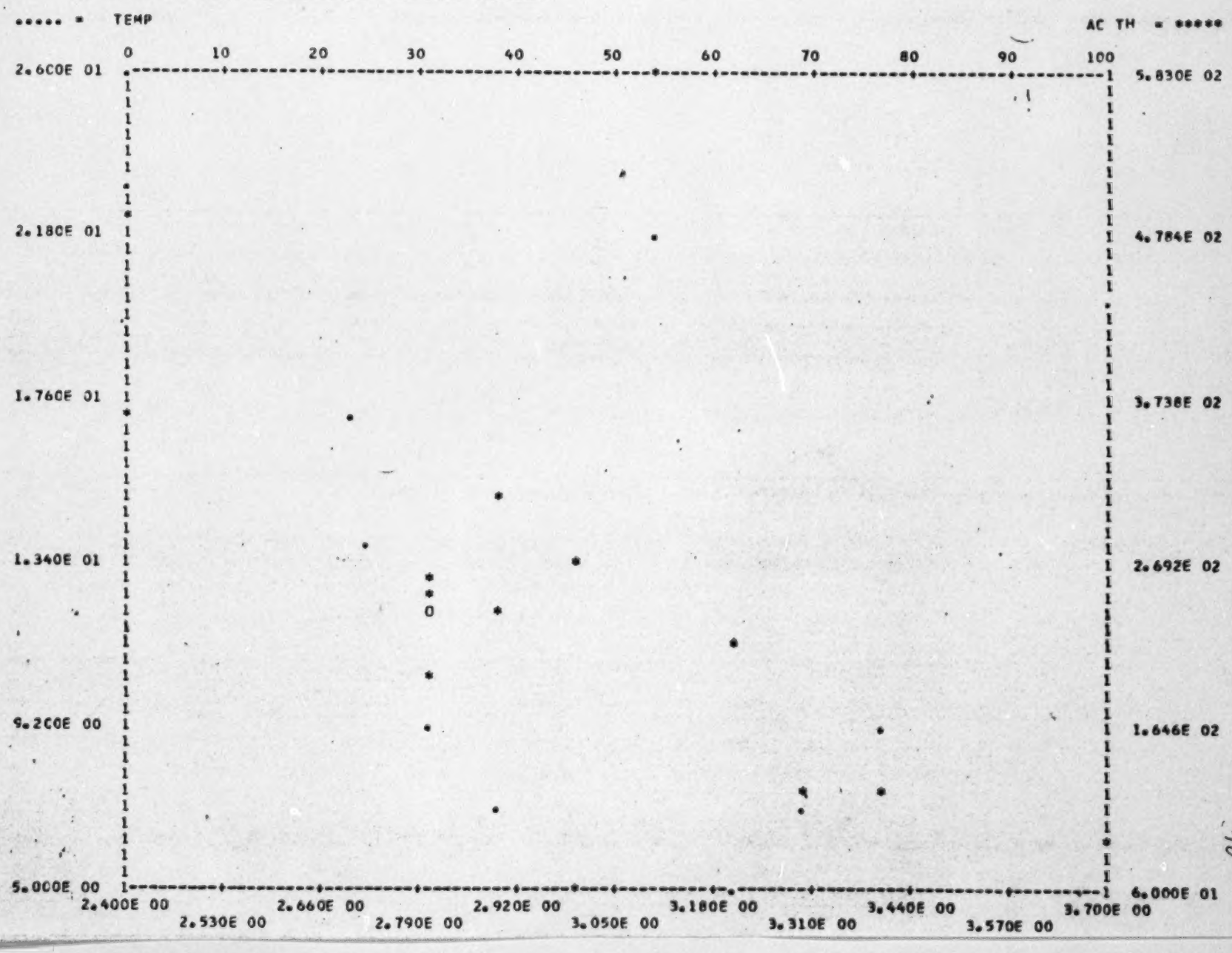
GRAPHICAL ANALYSIS.....TEST OF PLOTTING PROGRAM



X-Y PLOTTING

| TITLE | INPUT ID | N | M | ***** OPTIONS ***** |
|---|---|---|---|---|
| TEST OF PLOTTING PROGRAM | DRAINAGE | 448 | 10 | 0 1 1 0 0 0 0 0 0 0 |

NUMBER OF VALID OBSERVATIONS FOR PH VERSUS TEMP - 31

NUMBER OF VALID OBSERVATIONS FOR PH VERSUS AC TH - 35